

## TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT WASTE ENCAPSULATION AND STABILIZATION FOR CDI

**Identification No.:** RL-DD049

**Date:** August 2001

**Program:** Decontamination and Decommissioning

**OPS Office/Site:** Richland Operations Office/Hanford Site

**PBS No.:** RL-CP01

**Waste Stream:** LLW Debris (ER-05, risk = 4) and MLLW Debris (ER-02, risk = 4)

**TSD Title:** N/A

**Waste Management Unit:** N/A

**Facility:** Materials processing facilities (five processing canyons)

**Priority Rating:** This entry addresses the Accelerated Cleanup: Paths to Closure (ACPC) Priority:

- |              |  |
|--------------|--|
| _____        | 1. Critical to the success of the ACPC   |
| <u>  X  </u> | 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays) |
| _____        | 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.   |

**Need Title:** Encapsulation and stabilization of waste inside the 221-U Facility for the Canyon Disposition Initiative (CDI) Project. (This need statement does not address encapsulation of waste placed exterior to the facility as it is assumed standard burial procedures will apply.)

**Need/Opportunity Category:** *Technology opportunity* - the user is interested in the opportunity to improve on the currently identified or planned baseline technology.

**Need Description:** If the Canyon Disposal Initiative (CDI) record of decision is to use the 221-U Facility as a waste disposal site, then the site must meet waste disposal site requirements. Requirements include filling of void spaces in equipment and around waste packages to avoid subsidence. Stabilization of the facility structure is also required. Since the facility structure provides added protection from potential contamination leakage to the environment, it is necessary to assure the structure is maintained during and after waste disposal in the facility.

**Schedule Requirements:**

Earliest Date Required: Encapsulation and stabilization technology may be needed for operations as early as March 2003.

Latest Date Required: Unknown

**Problem Description:** There is a requirement for filling void spaces in shallow burial grounds. Using materials processing facilities for waste disposal will have the same requirements as a shallow burial site and will have to assure there is no damage to the structure, thus reducing the

probability of a potential contamination release to the environment. This need relates to functions number 2.0 and 3.0 of the CDI Feasibility Study.

***Benefit to the Project Baseline of Filling Need:*** Fulfilling this need will help enable the use of the canyon facilities as waste disposal facilities.

***Functional Performance Requirements:*** The encapsulation and stabilization technology must fill void spaces between waste packages, and be useable on a large scale (within the open area of a materials processing facility). The technology must be useable in a layered manner. As waste packages are layered within the facility, the encapsulation/stabilization technology can be applied to provide a surface for the next layer of waste and provide a continuous filler as multiple layers are added (no breaks in the material used). It is also required that the technology not damage the facility structure. The process must meet RCRA treatment standards for encapsulation. The “technology” includes the application process, the material to be applied, and the means of assuring void spaces have been filled.

***WBS No.***  
1.4.03.3.1.04.05.03.01.41.03

***TIP No.***  
N/A

***Relevant PBS Milestone:*** PBS-MC-030

***Justification for Need:***

***Technical:*** It is required that void spaces be filled in burial grounds to avoid subsidence and that waste be stabilized to reduce the potential for a release to the environment. Also, due to the defined use of the facilities, it is required that the structural integrity of the facility be maintained.

***Regulatory:*** RCRA treatment standards may apply to some waste disposed to the canyon. Encapsulation may be proposed as the single treatment standard.

***Environmental Safety and Health:*** By assuring no subsidence, stabilization of the waste, and structural integrity, there will be minimal potential for a release to the environment.

***Cost Savings Potential (Mortgage Reduction):*** Rough order of magnitude (ROM) life cycle cost (LCC) savings of \$55K. LCC savings estimate is based on the assumption that a waste encapsulation technology would reduce the total operations and management (O&M) costs of the close in place – collapsed structure alternative by 1%. The close in place – collapsed structure (alternative 6) O&M costs are estimated as \$1.1M in DOE/RL-2001-29 Draft A.. A Record of Decision (ROD) will determine the disposition of the 221-U Facility.

***Cultural/Stakeholder Concerns:*** Encapsulation will minimize spread of contamination.

***Other:*** There are five main processing facilities on the Hanford Site, two at Idaho, and one at Savannah River. Technologies that meet the needs at the 221-U Facility will be applicable at these and other similar DOE facilities.

***Current Baseline Technology:*** The planned baseline for encapsulation at the 221-U Facility is concrete or soil (CDI Feasibility Study). Typical waste package (i.e., individual packages) fillers include zeolite and dirt. Grout, bentonite, and diatomaceous earth have also been used for encapsulation and stabilization of individual packages.

***End-User:*** Waste Management Project, Environmental Restoration Project, and Facility Stabilization Project

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